Specification for the data acquisition of the small scale heat exchanger test

Principle

The table 1 lists the specific instrumentation used in the test of the small-scale heat exchanger (c.f. detailed list of the instrumentation). A total of 10 channels will permit to run the test:

3 temperature transmitters, 2 pressure transducers, 2 level indicators, and 2 heaters, plus a free channel.

Those device signals are available via two 19-pins connectors. Signals are distributed to 2 DVM (HP), 3457_A1 and 3457_A2 according to the electrical schematic. Each of the 10 devices is supplied by their respective power supply.

The two DVM will communicate the read voltages to the computer using a specific program (quickbasic).

Table 1. Instrumentation list

Co	#	Instrumentation	Power Supply	Read out
1	1	**Germanium temperature transmitter**	K220 (1 µA)	DVM 3457_A1 / 0-30 mV
	2	**Cernox temperature transmitter**	K220 (1 µA)	DVM 3457_A1 / 0-30 mV
	3	**Superconductor He level indicator – 6"**	PS – 6186C (75 mA)	DVM 3457_A2 / 0-30 V
	4	**Superconductor He level indicator – 12"**	PS – 6186C (75 mA)	DVM 3457_A2 / 0-30 V
2	5	**Germanium temperature transmitter**	K220 (1 µA)	DVM 3457_A1 / 0-30 mV
	6	**Heater 1**	PS _ 6181 (0-250 mA)	DVM 3457_A2 / 0-30 V
	7	**Heater 2**	PS _ 6181 (0-250 mA)	DVM 3457_A2 /0-30 V
	8	**Point He level indicator**	Battery (9 V)	
	9	**Pressure transmitter**	PS_ (0-15 VDC)	DVM 3457_A2 /0-30 V
	10	**Pressure transmitter**	PS_ (0-15 VDC)	DVM 3457_A2 /0-30 V

Instrumentation

- Ten sensors will be mounted inside and outside the corrugated heat exchanger, immerged into the HeII or in the insulation vacuum.
- One Germanium and one Cernox temperature transmitter will record redundant measurement of the temperature in the HeII pressurized bath.
- One Germanium will record the outside temperature of the HeII saturated bath.
- The level indicators will enable to monitor/control the test.

General information to take into account for the data acquisition procedure:

- The data acquisition system will read all the instrumentation, except the point level indicator, which will be equipped of its own read out I/O system.
- The two heaters are redundant device and will be supplied one at a time. The read-out voltage of the two heaters will be available on two separate channels.
- A current source will supply all temperature transmitters in serial.
- Each DVM, A1 and A2, allow eight time two-wire channels measurement. In order to uneasy the test, we will record 10 channels, (one empty A1_3): 4 channels on the first DVM_A1 and 6 channels on the second DVM_A2.

Note: The data acquisition system can not be used as a control system for any of these devices.

The table 2 refers the parameters of the data acquisition.

Table 2. Acquisition time

| #	Instrumentation	Acquisition frequency	Validity	Channel	Name
1	**Germanium temperatures transmitters**	Fr_acq* data per second	Tval* seconds	A1_0	T1
2	**Cernox temperature transmitter**	Fr_acq data per second	Tval seconds	A1_1	T2
3	**Superconductor He level indicators – 6"**	Fr_acq data per second	Tval seconds	A2_0	LT1
4	**Superconductor He level indicators – 12"**	Fr_acq data per second	Tval seconds	A2_1	LT2
5	**Germanium temperatures transmitters**	Fr_acq data per second	Tval seconds	A1_2	T3
6	**Heater 1**	Fr_acq data per second	Tval seconds	A2_2	H
7	**Heater 2**	Fr_acq data per second	Tval seconds	A2_3	Hbis
8	**Point He level indicator**	No acquisition			LTpoint
9	**Pressure transmitter (ins:1000 torr)**	Fr_acq data per second	Tval seconds	A2_4	PT1
10	**Pressure transmitter (out:100torr)**	Fr_acq data per second	Tval seconds	A2_5	PT2

Note: Fr_acq will be given according to the need. By default the value will be 10 for the steady state.

Tval will be given according to the need. By default the value will be 20 for the steady state.

Procedure for the data-acquisition of SSHx instrumentation measurement:

1. The operator must run the program named SSHX : start

2. Write the question : " What is the intensity of the current to supply to the chosen heater [0-250 mA]?:" A$

3. Write: "Now, apply manually the current" ;A$; "to the PS_6181"

4. Write: "After one minute, press Enter"

5. The program will perform the data acquisition: record 10*Fr_acq data per second, during Tval seconds. Each channel will be read, 10 times every second, for the DVM_A1 and DVM_A2. Sequences of all the instrumentation measurements will be as following: A1_0, A1_1, A1_2, A1_3,   A2_0, A2_1, A2_2, A2_3, A2_4, A2_5

6. Display all data on the screen + names of sensors + the intensity supplies to the heater.

7. Write the question: "Do you want to save the output data to a file?"

8. If yes write the question: "Enter the name of the given file?" file$

9. Save the data + A$ into a file named "file$"

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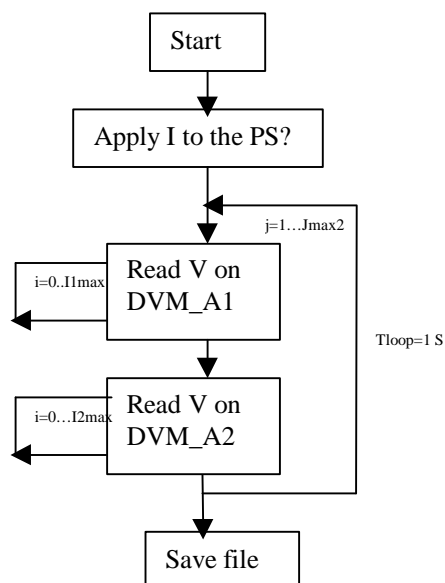
The program will enable to change the parameters:
- Jmax (50 by default),
- I1max (3 by default)
- and I2max (5 by default)

Note: A similar program SSHXtr.bas is available to record data during the transient state. Ex:
- Fr_acq=1 sec
- Tval= 1 hour (to check)